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**DETERMINATION OF THE TENSION FORCE OF THE PRESSURE  
SPRING GIVEN TO THE BINDER WHEN SOFTENING THE CRUSH  
BETWEEN COTTON ROWS**

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**Abstract:** The article presents the results of a theoretical study on determining the tension force of the pressure spring applied to the bobbin in loosening the knot between the rows of cotton. In this case, it was determined using analytical expressions that the tension force of the pressure spring of the parallelogram mechanism with the roller should be in the range of 353-358 N in order for it to sink to the specified depth.

**Key words:** roller, loosening of roller, depth of immersion of roller into the soil, parallelogram mechanism, large diameter of roller, pressure spring, weight force, tension force.

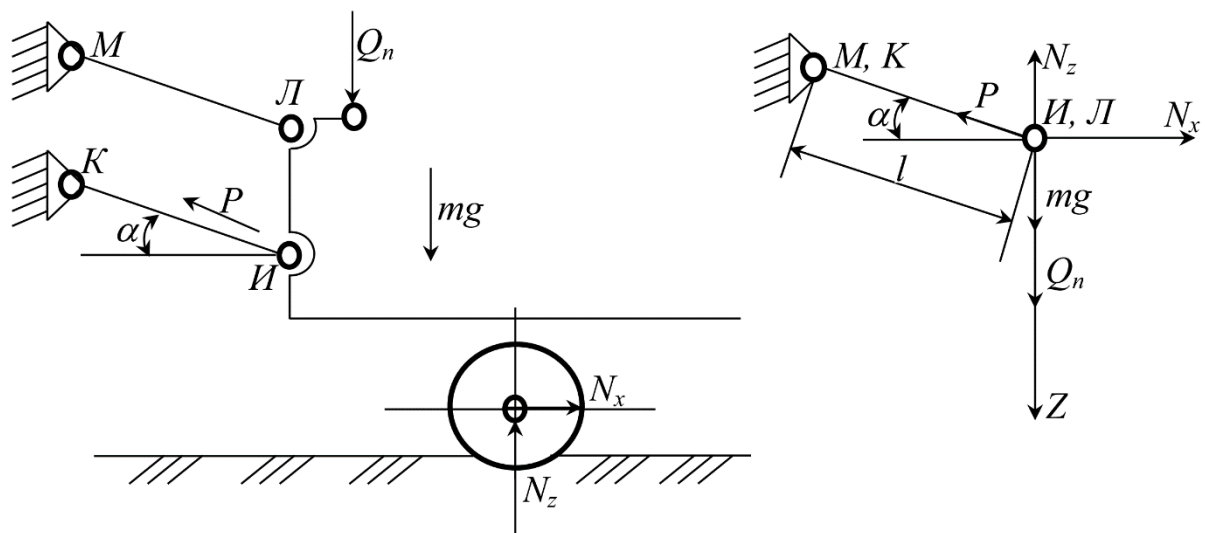
It is known from the conducted studies that the degree of softening of the slag is explained by the increase in the impact of working bodies on the slag as the speed of movement increases. At the same time, the increase in aggregate movement speed causes an increase in the traction resistance of the working bodies. At the same vertical load and movement speed, the working bodies sink into the soil to a greater depth [1, 2, 3, 4]. Taking these into account, in our example, it is important to provide a uniform vertical load to the roller in order to ensure that it is continuously softened to the desired level.

In the process of work, the following forces affect the coil ( Fig. 1).

- weight force  $mg$  (where  $m$  is the mass of the working section of the cotton cultivator with the parallelogram mechanism and gryadili, kg;  $g$  is the acceleration of free fall,  $m/s^2$ );

- $Q_n$  is the tension force of the pressure spring of the parallelogram mechanism, N;
- $N_x, N_z$  are the longitudinal and vertical components of the reaction force  $N_u$  exerted by the soil on the coil, respectively, N. These forces are placed at the center of rotation of the coil.
- $P$  is the pulling force exerted on the roller by the parallelogram mechanism, N. This force is directed parallel to the parallelogram mechanism's longitudinal pulls.

It is known from the literature [5, 6] that when the working bodies are connected to the machine frame by means of a parallelogram mechanism, all the forces acting on them can be considered as being placed on the moving hinges I and L of the parallelogram mechanism, and the mathematical pendulum depicted in Fig. 1, b can be accepted as a calculation scheme.



a) general scheme    b) accounting scheme

**Figure 1. Scheme of forces acting on the coil**

We determine the tension force of the pressure spring of the parallelogram mechanism installed on the roller using the calculation scheme in Fig. 1, b. For this, we create the balance equation of the forces acting on the coil

$$P \cos \alpha - N_x = 0; \quad (1)$$

$$mg + Q_n - P \sin \alpha - N_z = 0; \quad (2)$$

$$(mg + Q_n - N_z)l \cos \alpha - N_x \sin \alpha = 0, \quad (3)$$

in this  $\alpha$  – the angle of deviation of the parallelogram mechanism's longitudinal pulls from the horizon, °;

$l$  – the length of the parallelogram mechanism's longitudinal pulls, m .

the expression (3) with respect to  $Q_n$

$$Q_n = N_z + N_x \operatorname{tg} \alpha - mg. (4)$$

$N_x = \mu N_z$  (where  $\mu$  – rolling resistance coefficient of the coil) [7, 8, 9, 10]

expression (4) takes the following form.

$$Q_n = N_z (1 + \mu \operatorname{tg} \alpha) - mg. (5)$$

$N_z = Q$  considering that

$$Q_n = \frac{2}{3} q_0 (1 + K_v V_u^2) (R_1 - R_2) b_p B (1 + \mu \operatorname{tg} \alpha) - mg. (6)$$

,  $K_v$ ,  $R_1$ ,  $V_u$ ,  $R_2$ ,  $b_p$  and  $B$  values given above  $\mu$  into this expression  $q_0$  and  $=0.2$ ,  $\alpha = 10^\circ$  and  $m = 62$  kg, we determine that the tension force of the pressure spring of the parallelogram mechanism installed with the roller at the speed of movement of 1.7 - 2.2 m/s should be in the range of 353 - 358 N for it to sink to the specified depth.

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